

GRAIN INSPECTION HANDBOOK

BOOK II, CHAPTER 12

TRITICALE

CHAPTER 12

TRITICALE

Section Number	Section	Page Number
12.1	GENERAL INFORMATION	12-1
12.2	GRADES AND GRADE REQUIREMENTS	12-1
12.3	GRADE DESIGNATIONS	12-2
12.4	SPECIAL GRADES	12-3
12.5	OPTIONAL GRADE DESIGNATION	12-4
12.6	BASIS OF DETERMINATION	12-4
12.7	DEFINITION OF TRITICALE	12-5
12.8	HEATING	12-6
12.9	ODOR	12-6
12.10	MOISTURE	12-7
12.11	GARLICKY AND LIGHT GARLICKY TRITICALE	12-8
12.12	INFESTED TRITICALE	12-8
12.13	DISTINCTLY LOW QUALITY	12-9
12.14	U.S. SAMPLE GRADE CRITERIA	12-10
12.15	DOCKAGE	12-12
12.16	TEST WEIGHT	12-18
12.17	PROCESSING THE WORK SAMPLE	12-18
12.18	ERGOTY TRITICALE	12-20
12.19	SMUTTY AND LIGHT SMUTTY TRITICALE	12-20
12.20	SHRUNKEN AND BROKEN KERNELS	12-21
12.21	FOREIGN MATERIAL	12-22
12.22	DAMAGED KERNELS	12-22
12.23	HEAT-DAMAGED KERNELS	12-24
12.24	DEFECTS	12-24

Tables/Charts

Table No. 1	Grades and Grade Requirements – Triticale	12-2
Table No. 2	Basis of Determination	12-5
Table No. 3	Odor Classification Examples	12-6
Table No. 4	Insect Infestation	12-9
Table No. 5	U.S. Sample Grade Criteria	12-11
Table No. 6	Approximate Analytical Portion Sizes	12-20
Chart 1	Procedure for Determining Dockage	12-13
Chart 2	Dividing the Work Sample	12-19

12.1 GENERAL INFORMATION

- a. All quantities referenced in this chapter are approximate unless otherwise specified.
- b. Use an approved divider to obtain sub portions of a sample for analysis unless otherwise specified.
- c. If an approved mechanical shaker is unavailable, inspectors may handsieve the sample. When handsieving, hold the sieve level in both hands with elbows close to the sides. In a steady motion, move the sieve from left to right approximately 10 inches and then return from right to left. Repeat this motion 30 times.
- d. Official inspection personnel shall document inspection information during sampling and grading. See book IV, chapter 2.

The inspection process provides various factor information used to determine grade and to provide further information on the condition or quality of triticale. Each section of this chapter provides details on recording factor information. If requested by the applicant for inspection, additional information may be provided (e.g., an exact count on stones in addition to the percentage by weight, a percentage for a specific type of damage, etc.).

12.2 GRADES AND GRADE REQUIREMENTS

There are no subclasses in triticale. Triticale is divided into four U.S. numerical grades and U.S. Sample Grade. Special grades are provided to emphasize special qualities or conditions affecting the value of triticale and are added to and made a part of the grade designation. Special grades do not affect the numerical or sample grade designation.

**TABLE NO. 1 - GRADES AND GRADE REQUIREMENTS -
TRITICALE**

Grade	Minimum Limits of -	Maximum Limits of -					
	Test weight per bushel (pounds)	Damaged Kernels		Foreign Material		Shrunk and broken kernels (percent)	Defects <u>3</u> / (percent)
		Heat damaged (percent)	Total <u>1</u> / (percent)	Material other than wheat or rye (percent)	Total <u>2</u> / (percent)		
U.S. No. 1	48.0	0.2	2.0	1.0	2.0	5.0	5.0
U.S. No. 2	45.0	0.2	4.0	2.0	4.0	8.0	8.0
U.S. No. 3	43.0	0.5	8.0	3.0	7.0	12.0	12.0
U.S. No. 4	41.0	3.0	15.0	4.0	10.0	20.0	20.0
<p>U.S. Sample Grade:</p> <p>U.S. Sample Grade is triticale that:</p> <p>(a) Does not meet the requirements for grades U.S. No.1, 2, 3, or 4; or</p> <p>(b) Contains 8 or more stones or any number of stones which have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (<i>Crotalaria</i> spp.), 2 or more castor beans (<i>Ricinus communis</i> L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 2 or more rodent pellets, bird droppings, or an equivalent quantity of other animal filth per 1 1/8 to 1 1/4 quarts of triticale; or</p> <p>(c) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or</p> <p>(d) Is heating or otherwise of distinctly low quality.</p> <p><u>1</u>/ Includes heat-damaged kernels.</p> <p><u>2</u>/ Includes material other than wheat or rye.</p> <p><u>3</u>/ Defects include damaged kernels (total), foreign material (total), and shrunk and broken kernels. The sum of these three factors may not exceed the limit for defects for each numerical grade.</p>							

12.3 GRADE DESIGNATIONS

After completing the analysis, compare the results with the limits for each grade factor specified in table 1. Use the following guidelines when assigning grades.

- The letters "U.S.";
- The abbreviation "No." and the number of the grade or the words "Sample Grade";
- The words "or better" when applicable;
- The word "Triticale";
- The applicable special grade in alphabetical order; and
- The word "Dockage" and the percentage thereof.

12.4 SPECIAL GRADES

Special grades draw attention to unusual conditions in grain and are made part of the grade designation. The definitions and examples of the designations for special grades in triticale are:

- a. Ergoty Triticale. Triticale that contains more than 0.10 percent of ergot.

Example: U.S. No. 2 Triticale, Ergoty

- b. Garlicky Triticale. Triticale that contains in a 1,000-gram portion more than six green garlic bulblets or an equivalent quantity of dry or partly dry bulblets.

Example: U.S. No. 3 Triticale, Garlicky

- c. Infested Triticale. Triticale that is infested with live weevils or other live insects injurious to stored grain.

Example: U.S. No. 2 Triticale, Infested

- d. Light Garlicky Triticale. Triticale that contains in a 1,000-gram portion two or more, but not more than six, green garlic bulblets or an equivalent quantity of dry or partly dry bulblets.

Example: U.S. No. 2 Triticale, Light Garlicky

- e. Light Smutty Triticale. Triticale that has an unmistakable odor of smut, or that contains in a 250-gram portion smut balls, portions of smut balls, or spores of smut in excess of a quantity equal to 14 smut balls, but not in excess of a quantity equal to 30 smut balls of average size.

Example: U.S. No. 1 Triticale, Light Smutty, Dockage 1.0%

- f. Smutty Triticale. Triticale that contains in a 250-gram portion smut balls, portions of smut balls, or spores of smut in excess of a quantity equal to 30 smut balls of average size.

Example: U.S. No. 2 Triticale, Smutty

12.5 OPTIONAL GRADE DESIGNATION

The Official U.S. Standards for Grain provide for an optional grade designation, commonly referred to as "or better." Upon the request of an applicant, triticale may be certified as U.S. No. 2 or better, U.S. No. 3 or better, etc. An "or better" grade designation cannot be applied to a U.S. No. 1 grade designation.

Example: U.S. No. 3 or better Triticale

12.6 BASIS OF DETERMINATION

Distinctly Low Quality. The determination of distinctly low quality is made on the basis of the lot as a whole at the time of sampling when a condition exists that may or may not appear in the representative sample and/or the sample as a whole.

Certain Quality Determinations. Each determination of rodent pellets, bird droppings, other animal filth, broken glass, castor beans, cockleburrs, crotalaria seeds, dockage, garlic, live insect infestation, large stones, moisture, temperature, and unknown foreign substance(s), and a commonly recognized harmful or toxic substance is made on the basis of the sample as a whole. When a condition exists that may not appear in the representative sample, the determination may be made on the basis of the lot as a whole at the time of sampling according to procedures prescribed in FGIS instructions.

All Other Determinations. Each determination of heat-damaged kernels, damaged kernels, material other than wheat or rye, and foreign material (total) is made on the basis of the grain when free from dockage and shrunken and broken kernels. Other determinations not specifically provided for under the General Provisions are made on the basis of the grain when free from dockage, except the determination of odor is made on either the basis of the grain as a whole or the grain when free from dockage.

TABLE NO. 2

BASIS OF DETERMINATION			
Lot as a Whole	Factors Determined Before the Removal of Dockage	Factors Determined After the Removal of Dockage	Factors Determined After the Removal of Dockage and Shrunken and Broken Kernels
Distinctly low quality Heating Infested Odor	Distinctly low quality Garlic bulblets Infested Kind of grain Moisture Odor Odor (smut) Other unusual conditions U.S. Sample Grade factors	Ergot Kind of grain Odor Shrunken and broken kernels Smut Stones Test weight	Damaged kernels Foreign material (total) Foreign material other than wheat or rye Heat-damaged kernels

The following sections of this chapter are arranged in a logical sequence typically followed in the inspection and grading of triticale.

12.7 DEFINITION OF TRITICALE

Triticale is defined as:

Grain that, before the removal of dockage, consists of 50 percent or more of triticale (X Triticosecale Wittmack) and not more than 10 percent of other grains for which standards have been established under the United States Grain Standards Act and that, after the removal of dockage, contains 50 percent or more of whole kernels of triticale.

Whole kernels are kernels with three-fourths or more of the kernel present. Other grains for which standards have been established are barley, canola, corn, flaxseed, oats, rye, sorghum, soybeans, sunflower seed, and wheat.

Basis of Determination. Normally, a visual appraisal of the sample is sufficient to determine if it meets the definition of triticale. If an analysis is necessary, make the determination on a representative portion of 50 grams. Determine the percentage of triticale and other grains before the removal of dockage. Determine the percentage of whole kernels after the removal of dockage.

If the sample does not meet the definition of triticale, examine it further to determine if it is:

- a. Another grain for which standards have been established or
- b. Not standardized grain. No further analysis is necessary on a sample designated as not standardized grain unless a specific factor test is requested.

12.8 HEATING

Triticale developing a high temperature from excessive respiration is considered heating. Heating triticale, in its final stages, will usually have a sour or musty odor. Care should be taken not to confuse triticale that is heating with triticale that is warm and moist because of storage in bins, railcars, or other containers during hot weather.

Basis of Determination. Determine heating on evidence obtained at the time of sampling or on the basis of the sample as a whole.

Certification. Grade heating triticale as U.S. Sample Grade and record the word "Heating" in the "Remarks" section of the certificate.

12.9 ODOR

Basis of Determination. Determine odor on evidence obtained at the time of sampling or on the sample either before or after the removal of dockage.

TABLE NO. 3

ODOR CLASSIFICATION EXAMPLES		
Sour	Musty	Commercially Objectionable Foreign Odors
Boot Fermenting Insect (acrid) Pigpen	Ground Insect Moldy	Animal hides Decaying animal and vegetable matter Fertilizer Fumigant Insecticide Oil products Skunk Smoke Strong weed

Commercially Objectionable Foreign Odors. Commercially objectionable foreign odors are odors, except smut and garlic odors, foreign to grain that render it unfit for normal commercial usage.

Fumigant or insecticide odors are considered commercially objectionable foreign odors if they linger and do not dissipate. When a sample of triticale contains a fumigant or insecticide odor that prevents a determination as to whether any other odor(s) exists, apply the following guidelines:

- a. Original Inspections. Allow the work portion to aerate in an open container for 4 hours, or less, if the odor dissipates in less time.
- b. Reinspections, Appeal and Board Appeal Inspections. Allow unworked file samples and new samples to aerate in an open container for 4 hours, or less, if the odor dissipates in less time. The 4-hour aeration requirement does not apply when the original work portion was aerated and retained as the final file.

Consider the sample as having a commercially objectionable foreign odor if the fumigant or insecticide odor persists based on the above criteria.

Final Determination. The inspector(s) is responsible for making the final determination for all odors. A consensus of experienced inspectors is used, whenever possible, on samples containing marginal odors. The consensus approach is not required if no odor or a distinct odor is detected.

Certification. Grade triticale containing a "distinct" musty, sour, or commercially objectionable foreign odor as U.S. Sample Grade. Record the words "Musty," "Sour," or "Commercially Objectionable Foreign Odor" in the "Remarks" section of the certificate.

12.10 MOISTURE

Water content in grain as determined by an approved device according to procedures prescribed in FGIS instructions.

Basis of Determination. Determine moisture before the removal of dockage on a portion of approximately 350 grams.

The procedures for performing a moisture determination using the DICKEY-john Grain Analysis Computer GAC 2100 moisture meter are described in book II, chapter 1, section 1.10.

Certification. Record the percent of moisture on the certificate to the nearest tenth percent.

12.11 GARLICKY AND LIGHT GARLICKY TRITICALE

- a. Garlicky Triticale. *Triticale that contains in a 1,000-gram portion more than six green garlic bulblets or an equivalent quantity of dry or partly dry bulblets.*
- b. Light Garlicky Triticale. *Triticale that contains in a 1,000-gram portion two or more, but not more than six green garlic bulblets or an equivalent quantity of dry or partly dry bulblets.*

Basis of Determination. Determine garlicky and light garlicky before the removal of dockage on a portion of 1,000 grams. (Reference: Visual Reference Image Nos. [OF-13.0](#) and [OF-13.1](#)).

Characteristics of Bulblets.

- a. Green garlic bulblets are bulblets which have retained all of their husks intact.
- b. Dry or partly dry garlic bulblets are bulblets which have lost all or part of their husks. Consider bulblets with cracked husks as dry.

NOTE: Wild onion, sometimes referred to as “crow garlic”, is considered as garlic.

Three dry or partly dry garlic bulblets are equal to one green bulblet.

Garlic bulblets apply in the determination of "Light Garlicky" and "Garlicky" but also function as dockage or foreign material, as the case may be.

Certification. When applicable, record the words "Light Garlicky" or "Garlicky" in accordance with Section 12.4, Special Grades. Upon request, record the number of garlic bulblets in whole and thirds.

12.12 INFESTED TRITICALE

Infested triticale is triticale that is infested with live weevils or other live insects injurious to stored grain.

The presence of any live weevil or other live insects injurious to stored grain indicates the probability of infestation and warns that the triticale must be carefully examined to determine if it is infested. In such cases, examine the work sample and the file sample before reaching a conclusion as to whether or not the triticale is infested. Do not examine the file sample if the work portion is insect free.

Live weevils shall include rice weevils, granary weevils, maize weevils, cowpea weevils, and lesser grain borers. Other live insects injurious to stored grain shall include grain beetles, grain moths, and larvae. (See Chapter 1, Section 1.2, Visual Grading Aids.)

Basis of Determination. Determine infestation on the lot as a whole and/or the sample as a whole. For insect tolerances, see table No. 4.

TABLE NO. 4

INSECT INFESTATION		
<i>Samples meeting or exceeding any one of these tolerances are infested: 2 lw, or 1 lw + 1 oli, or 2 oli</i>		
1,000-gram representative sample <u>1/</u> (+ file sample if needed)	Lot as a Whole (Stationary)	Online Sample (In-Motion) <u>2/</u>
Submitted samples Probed lots D/T sampled land carriers	Probed lots (at time of sampling)	Railcars under the Cu-sum Subsamples for Sacked Grain lots Components for Bargelots <u>3/</u> Components for Shiplots <u>3/</u>
<u>1/</u> Examine work portion and file sample if necessary. Do not examine file sample if work portion is insect free. <u>2/</u> Minimum sampling rate is 500 grams per 2,000 bushels. <u>3/</u> Minimum component size is 10,000 bushels.		
<u>Key:</u> lw = live weevil, oli = other live insects injurious to stored grain		

Certification. Record the word "Infested" on the certificate in accordance with Section 12.4, Special Grades.

12.13 DISTINCTLY LOW QUALITY

Consider triticale distinctly low quality when it is obviously of inferior quality and the existing grade factors or guidelines do not properly reflect the inferior condition.

Basis of Determination. Use all available information to determine distinctly low quality. This includes a general examination of the triticale during sampling and an analysis of the obtained sample(s).

Large Debris. Triticale containing two or more stones, pieces of glass, pieces of concrete, or other pieces of wreckage or debris which are visible to the sampler but are too large to enter the sampling device is considered distinctly low quality.

Other Unusual Conditions. Triticale that is obviously affected by other unusual conditions which adversely affect its quality but which cannot be properly graded by use of the grading factors specified or defined in the standards is considered distinctly low quality.

Triticale suspected of containing diatomaceous earth is considered distinctly low quality unless the applicant specifically requests an examination to verify the presence of diatomaceous earth. If the laboratory examination verifies that the triticale contains diatomaceous earth, then the triticale is not considered distinctly low quality due to diatomaceous earth. Refer to Program Directive 9180.49, Grading and Certification of Grain Containing Diatomaceous Earth and Silica Gel, for additional information regarding the testing of triticale for diatomaceous earth.

Certification. Grade distinctly low quality triticale as U.S. Sample Grade. Record the words "Distinctly Low Quality" and the reason(s) why in the "Remarks" section of the certificate.

12.14 U.S. SAMPLE GRADE CRITERIA

Basis of Determination. Determine additional U.S. Sample Grade criteria, except for stones, before the removal of dockage based on a work portion of 1,000 - 1,050 grams. Determine stones on a dockage-free portion. Table No. 5 shows the criteria and corresponding Visual Reference Images, tolerance limits, and the appropriate basis of determination. Consider identifiable pieces of grain, processed grain products (e.g., soybean meal, sorghum grits, corn meal, bulgur, etc.), or feed pellets in grain as foreign material. Unidentifiable materials or material unrelated to grain shall function as "unknown foreign substance."

TABLE NO. 5

U.S. SAMPLE GRADE CRITERIA			
Criteria	Visual Reference Image	Number/Weight <u>1/</u>	
		Sample Basis	Lot Basis <u>2/</u>
Any numerical grading factor		Excess of limit for U.S. No. 4	N/A
Animal filth	OF-1.0	2 or more	N/A
Castor Beans	OF-3.0	2 or more	N/A
Crotalaria seeds	OF-8.0	3 or more	N/A
Glass		2 or more	N/A
Odor		Presence	N/A
Stones		8 or more or any number in excess of 0.2% by weight	N/A
Unknown foreign substances <u>3/</u>	OF-31.0	4 or more	N/A
Heating		Presence	Presence
Large Debris *		N/A	2 or more
Other unusual conditions *		Presence	Presence
<u>1/</u> Record count factors to the nearest whole number.			
<u>2/</u> The entire sample of a submitted sample is considered as the lot.			
<u>3/</u> Consider feed pellets and processed grain products as foreign material, not unknown foreign substance.			
* For Distinctly Low Quality, see section 12.13			

Certification. Grade triticale U.S. Sample Grade when one or more of the limits in table 5 are observed. Record the reason(s) why in the "Remarks" section of the certificate. Record count factors to the nearest whole number.

12.15 DOCKAGE

All matter other than tritcale that can be removed from the original sample by use of an approved device according to procedures prescribed in FGIS instructions. Also, underdeveloped, shriveled, and small pieces of tritcale kernels removed in properly separating the material other than tritcale and that cannot be recovered by properly rescreening or recleaning.

Basis of Determination. Determine dockage on a portion of 1,000 - 1,050 grams of the original sample.

When performing the dockage determination, check the material that passes over the riddle for threshed or unthreshed kernels and sprouted kernels of tritcale.

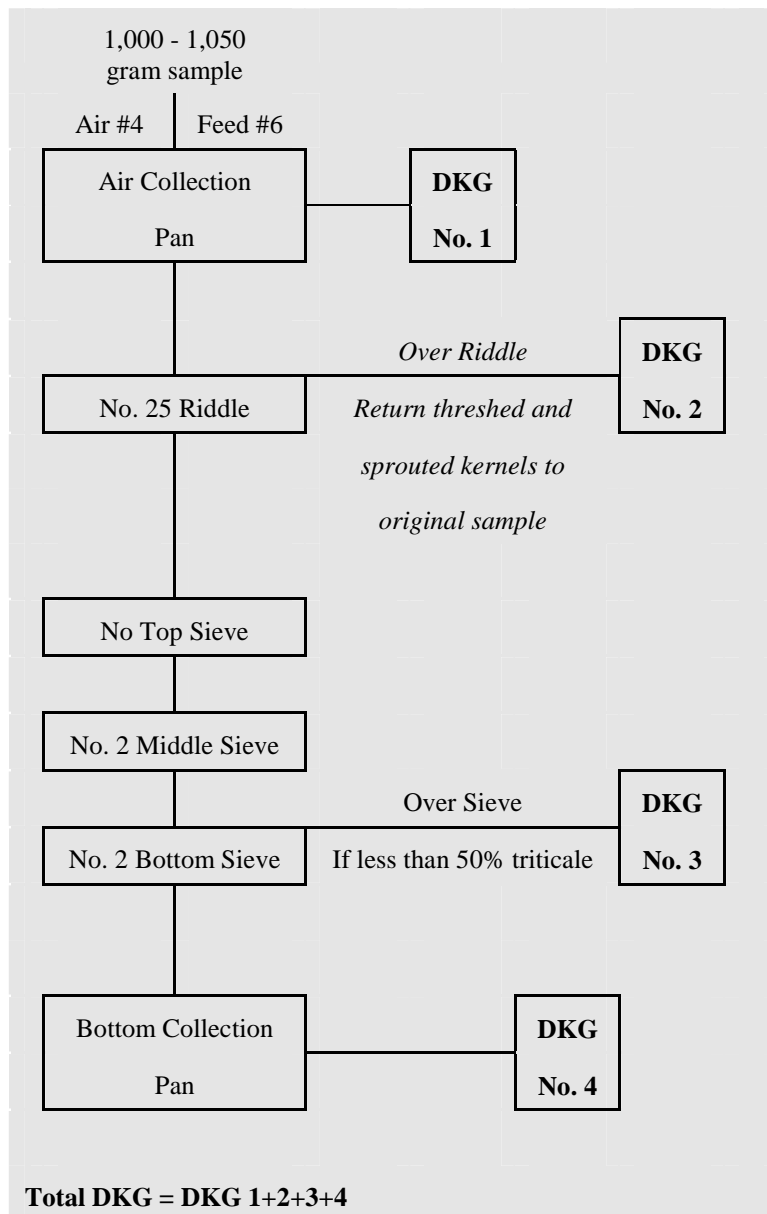
Threshed and sprouted kernels that pass over the riddle are not considered dockage. Return all such kernels to the dockage-free sample. Threshed kernels of tritcale are kernels with either no glumes attached or not more than one glume attached.

Unthreshed kernels that pass over the riddle are considered dockage. Unthreshed kernels are kernels with more than one glume attached. (Reference: Visual Reference Image No. [OF-30.0](#))

CHART 1 - PROCEDURE FOR DETERMINING DOCKAGE

Carter Dockage Tester Setup

- Set air control on 4 and the feed control on 6.
- Insert No. 25 plastic riddle in the riddle carriage.
- Use no sieve in the top sieve carriage.
- Insert a No. 2 sieve in the middle and bottom sieve carriages.
- Start carter Dockage Tester and pour sample into feed hopper.
- Aspirated material in the air collection pan is dockage.
- Material over the riddle, except for threshed and sprouted kernels, is dockage.
- Material that passed through the bottom sieve is dockage.
- Material passing over the bottom sieve is dockage if it contains less than 50 percent by weight of whole or broken kernels of triticale. When more than 50 percent of whole or broken kernels are found, return the material to the cleaned triticale.



To avoid repeating operations, check the dockage for garlic bulblets, infestation, and U.S. Sample Grade factors (except stones). (See sections 12.11, 12.12, and 12.14.)

Certification. Record the word "Dockage" and the percentage on the work record in hundredths and the certificate in accordance with section 12.3, Grade Designations. State the percent of dockage on the certificate in whole and half percent with a fraction less than one-half percent disregarded.

Example: 0.50 to 0.99 percent record as 0.5 percent
 1.00 to 1.49 percent record as 1.0 percent, etc.

Additional Dockage Procedures. When triticale contains wild buckwheat or similar seeds, chess or similar seeds, or flaxseed, determine dockage as follows:

- a. Triticale Containing Wild Buckwheat or Similar Seeds: If it appears that the sample contains more than 0.5 percent of wild buckwheat or similar seeds, analyze a portion of approximately 50 grams before the removal of dockage. When the representative portion contains more than 0.5 percent of wild buckwheat or similar sized seeds, proceed as follows: (Reference: Visual Reference Image No. [OF-27.0](#))
 - (1) Set up the Carter dockage tester as follows:
 - (a) Set the air control at 4;
 - (b) Set the feed control at 6;
 - (c) Insert a Number 25 plastic riddle in the riddle carriage;
 - (d) Use no sieve in the top sieve carriage;
 - (e) Insert a Number 8 sieve in the middle sieve carriage; and
 - (f) Insert a Number 2 sieve in the bottom sieve carriage.
 - (2) After removing the dockage, sieve approximately 50 grams of the material that passed over the Number 2 sieve (bottom collection pan) by placing it on the upper edge of a 5/64 equilateral triangular hand sieve. Hold the sieve at a 10 to 20-degree angle and work the material down over the sieve with a gentle side-to-side motion.
 - (3) Repeat "Step 2" on additional 50-gram portions until all the material in the bottom collection pan has been sieved.
 - (4) If the material remaining on top of the hand sieve consists of 50 percent or more, by weight, of whole or broken kernels of triticale, return it to the cleaned triticale. Otherwise, add it to the dockage.

- (5) Examine the material that passed through the hand sieve. If the material consists of 50 percent or more, by weight, of whole or broken kernels of triticale, repeat the hand sieving process on 50-gram portions of all the material that passed through the hand sieve. Do not perform this hand sieving process more than twice.
- (6) All material that passed through the hand sieve is dockage.
- (7) Dockage will then consist of:
 - (a) The material removed by the aspirator (air collection pan);
 - (b) The coarse material, except threshed and sprouted kernels of triticale, that passed over the riddle (riddle collection pan);
 - (c) The material that passed through the Number 2 sieve (bottom collection pan);
 - (d) The material that passed through the hand sieve; and
 - (e) The material that remained on the hand sieve when the material consists of less than 50 percent, by weight, of triticale.
- b. Triticale Containing Chess or Similar Seeds: If it appears that the sample contains more than 0.5 percent of chess or similar seeds, analyze a portion of approximately 50 grams cut from the original sample before the removal of dockage. If the representative portion contains more than 0.5 percent of chess or similar seeds, proceed as follows: (Reference: Visual Reference Image No. [OF-4.0](#))
 - (1) Set up the Carter dockage tester as follows:
 - (a) Set the air control at 4;
 - (b) Set the feed control at 6;
 - (c) Insert a Number 25 plastic riddle in the riddle carriage;
 - (d) Insert a Number 9 combination large chess swaged-hole sieve in the top sieve carriage;
 - (e) Use no sieve in the middle sieve carriage; and

- (f) Insert a Number 2 sieve in the bottom sieve carriage.
- (2) When the triticale has cleared the Number 9 sieve, clean the sieve by sliding it in and out of the carriages several times while the machine is operating. DO NOT collect material until the sieve has been cleaned.
- (3) Examine the triticale that passed over the Number 9 sieve (top collection pan). If it contains more than 0.5 percent of chess or similar seeds, repeat the operation one more time.
- (4) Examine the material that passed over the Number 2 sieve (bottom collection pan). If it consists of 50 percent or more, by weight, of whole or broken kernels of triticale, recomposite the entire sample and determine dockage using the normal dockage procedures.
- (5) When the material that passed over the Number 2 sieve consists of less than 50 percent of whole or broken kernels of triticale, dockage will consist of:
 - (a) The material removed by the aspirator (air collection pan);
 - (b) The coarse material, except threshed and sprouted kernels, that passed over the riddle (riddle collection pan);
 - (c) The material that passed through the Number 2 sieve (bottom collection pan); and
 - (d) The material that passed over the Number 2 sieve (bottom collection pan) when such material consists of less than 50 percent triticale. If the material that passed over the bottom sieve consists of 50 percent or more of whole or broken kernels of triticale, return it to the cleaned triticale.
- c. Triticale Containing Canola, Flaxseed, or Rapeseed: If it appears that the sample contains 0.3 percent or more of canola, flaxseed, or rapeseed, analyze a dockage-free portion of 50 grams. If the representative portion contains 0.3 percent or more of canola, flaxseed, or rapeseed, sieve the entire dockage-free sample. Use the appropriate sieve, a 5/64 triangular-hole sieve for removing canola/rapeseed, a 3/64-inch wide by 3/8-inch long or 3/64-inch wide by 11/32-inch long sieve for removing flaxseed as follows:
 - (1) Mechanical Sieving Method.
 - (a) Mount the sieve and a bottom pan on an approved mechanical sieve shaker.

- (b) Place one-fourth of the dockage-free portion in the center of the sieve.
 - (c) Set the stroke counter at 30 strokes.
 - (d) Follow the procedures described in Book II, Chapter 1, Section 1.13, Mechanical Sieve Shaker.
 - (e) When the shaker has stopped, return the material lodged in the perforations to the triticales remaining on top of the sieve.
 - (f) Clean the sieve and repeat this procedure with the remaining similar-sized portions.
- (2) Hand-Sieving Method:
- (a) Mount the sieve on a bottom pan.
 - (b) Place one-fourth of the dockage-free sample in the center of the sieve.
 - (c) Hold the sieve level in both hands with elbows close to the sides and the sieve perforations parallel to the direction of movement.
 - (d) In a steady motion, move the sieve from left to right approximately 10 inches and then return from right to left.
 - (e) Repeat this operation 30 times.
 - (f) Return the material lodged in the perforations to the triticales remaining on top of the sieve.
 - (g) Clean the sieve and repeat this procedure with the remaining similar-sized portions.
- (3) If the material which passed through the sieve consists of less than 50 percent, by weight, of whole or broken kernels of triticales, add it to the dockage. If it consists of 50 percent or more, by weight, of whole or broken kernels, recomposite it with the material remaining on top of the sieve.

- (4) Dockage will consist of:
 - (a) The material removed by the aspirator (air collection pan).
 - (b) The coarse material, except threshed and sprouted kernels, that passed over the riddle (riddle collection pan).
 - (c) The material that passed through the Number 2 sieve (bottom collection pan).
 - (d) The material which passed through the hand sieve if it consists of less than 50 percent, by weight, of whole and broken kernels of triticale.

12.16 TEST WEIGHT

The weight per Winchester bushel (2,150.42 cubic inches) as determined using an approved device according to procedures prescribed in FGIS instructions.

Basis of Determination. Determine test weight on a dockage-free portion of sufficient quantity to overflow the kettle.

The procedures for performing the test weight determination and available services are described in book II, chapter 1, section 1.11.

Certification. Record test weight results on the work record as displayed on the electronic scale or in whole and tenth pounds to the nearest tenth pound. Record the test weight on the certificate in whole and tenth pounds to the nearest tenth pound. If requested, convert the pounds per bushel (lbs./bu) result to kilograms per hectoliter (kg/hl) using the following formula: $\text{lbs./bu} \times 1.287 = \text{kg/hl}$ and record in the "Remarks" section in whole and tenths.

12.17 PROCESSING THE WORK SAMPLE

At this point, all tests required to be performed prior to the removal of dockage have been made and the percentage of dockage has been determined. Also, the sample has been test weighed and examined for certain sample grade and special grade factors. Now the work sample is ready to be divided into fractional portions for other determinations required after the removal of dockage. The following chart and table No. 6 illustrate how the sample is divided into fractional parts using the Boerner divider.

CHART 2 - DIVIDING THE WORK SAMPLE

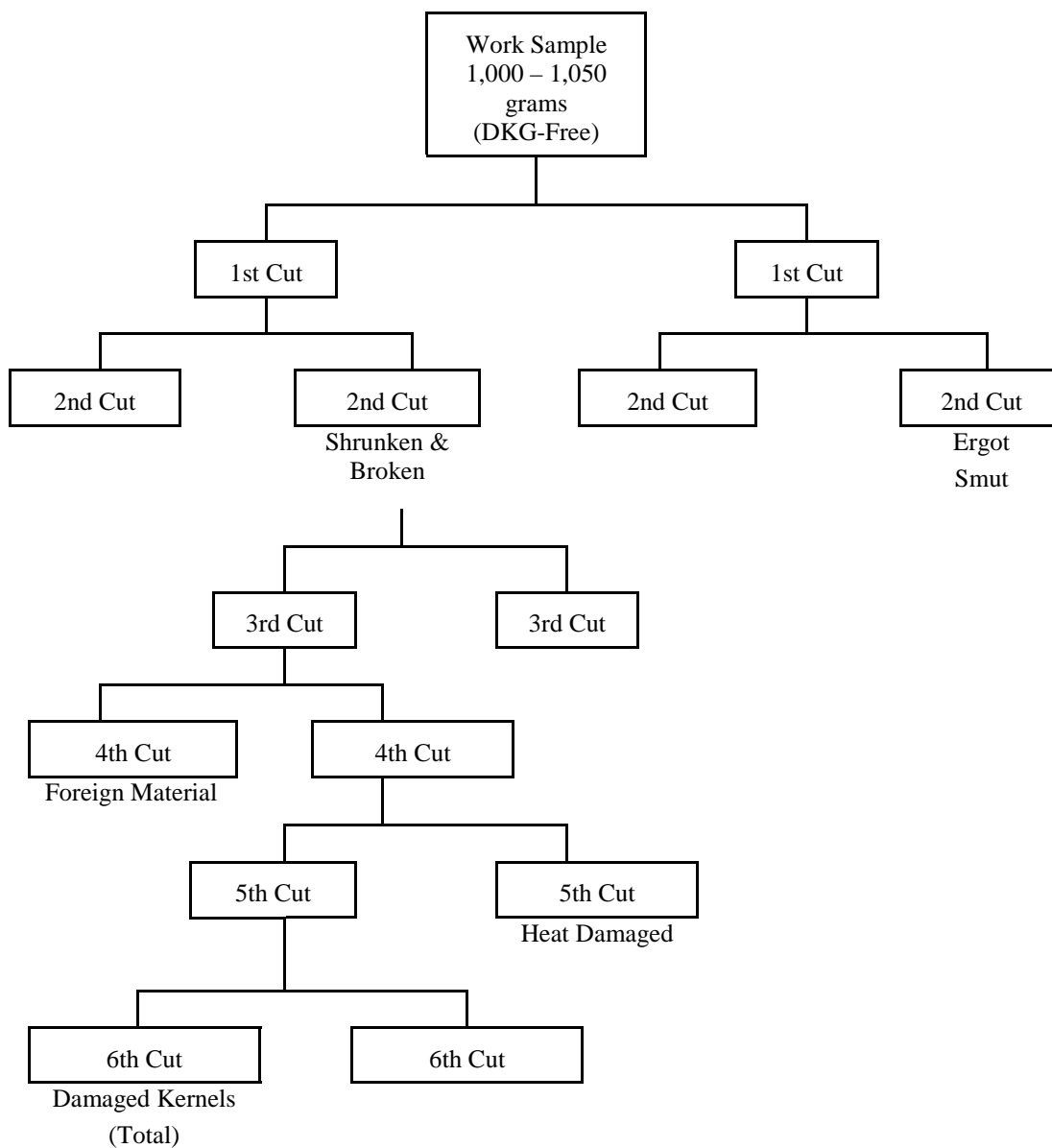


TABLE NO. 6

APPROXIMATE ANALYTICAL PORTION SIZES	
<i>Factors</i>	<i>Grams</i>
Ergot	250
Smut	250
Shrunken and broken kernels	250
Foreign material	50 <u>1/</u>
Damaged kernels (total)	15 <u>1/</u>
Heat-damaged kernels	30 <u>1/</u>
<u>1/</u> Factors determined after the removal of dockage and shrunken and broken kernels.	

12.18 ERGOTY TRITICALE

Triticale that contains more than 0.10 percent of ergot.

Ergot is a hard, reddish-brown or black grain-like mass of certain parasitic fungi that replaces kernels of triticale. (Reference: Visual Reference Image No. [OF-12.0](#))

Basis of Determination. Determine ergoty on a dockage-free portion of 250 grams except when the percentage of ergot has been requested to be shown on the certificate. When the percentage is to be shown on the certificate, make the determination on a dockage-free portion of approximately 1,000 grams. Ergot applies in the determination of ergoty but also functions as foreign material.

Certification. Record the word "Ergoty" on the certificate in accordance with Section 12.4, Special Grades. Upon request, record the percentage of ergot on the certificate to the nearest hundredth percent.

12.19 SMUTTY AND LIGHT SMUTTY TRITICALE

Smutty. *Triticale that contains in a 250-gram portion smutty and smut balls, portions of smut balls, or spores of smut in excess of a quantity equal to 30 smut balls of average size.*

Light Smutty. *Triticale that has an unmistakable odor of smut, or that contains in a 250-gram portion smut balls, portions of smut balls, or spores of smut in excess of a quantity equal to 14 smut balls but not in excess of a quantity equal to 30 smut balls of average size.*

Basis of Determination. Determine "Smutty" on 250 grams of dockage-free triticale. Determine "Light smutty" on the sample as a whole (odor only) or on 250 grams of dockage-free triticale.

Certification. Record the words "Smutty" or "Light Smutty" on the certificate in accordance with Section 12.4, Special Grades. Upon request, show the odor (in the case of Light smutty) or the number of smut balls on the certificate.

12.20 SHRUNKEN AND BROKEN KERNELS

All matter that passes through a 0.064 X 3/8 oblong-hole sieve after sieving according to procedures prescribed in FGIS instructions.

Basis of Determination. Determine shrunken and broken kernels on a dockage-free portion of 250 grams using one of the following methods:

a. Mechanical Sieving Method.

- (1) Mount a 0.064 x 3/8 oblong-hole (1.626 x 9.525 mm) sieve and a bottom pan on the mechanical sieve shaker.
- (2) Set the stroke counter for 30 strokes.
- (3) Follow the procedure described in Book II, Chapter 1, Section 1.13, Mechanical Sieve Shaker.
- (4) All material passing through the sieve is considered shrunken and broken kernels. Return the material lodged in the perforations to the triticale which remained on top of the sieve.

b. Hand Sieving Method.

- (1) Mount the approved sieve on a bottom pan.
- (2) Place the 250-gram portion in the center of the sieve.
- (3) Hold the sieve level in both hands with elbows close to the body and the sieve perforations parallel to the direction of movement.
- (4) In a steady motion, move the sieve from left to right approximately 10 inches and then return from right to left.
- (5) Repeat this operation 30 times.

- (6) All material passing through the sieve is considered shrunken and broken kernels. Return the material lodged in the perforations to the triticales which remained on top of the sieve.

Determine shrunken and broken kernels prior to analyzing the sample for heat-damaged kernels, damaged kernels, and foreign material.

Certification. Record the percent of shrunken and broken kernels on the certificate to the nearest tenth percent.

12.21 FOREIGN MATERIAL

All matter other than triticales.

Basis of Determination. Determine foreign material on a dockage-free and shrunken and broken-free portion of 50 grams.

In triticales, foreign material is subdivided into (1) foreign material other than wheat or rye and (2) foreign material (total).

- a. Foreign Material (Total). Remove all matter other than triticales from the representative portion and determine the percentage of foreign material (total).
- b. Foreign Material Other Than Wheat or Rye. Remove the wheat and rye from the total foreign material separation. The percentage of foreign material other than wheat or rye is then based on the remaining foreign material after the removal of wheat and rye.

Glumes are considered foreign material and are removed from the kernels of triticales.

Certification. Record the percent of foreign material other than wheat or rye and the percent of foreign material (total) on the certificate to the nearest tenth percent.

12.22 DAMAGED KERNELS

Kernels, pieces of triticales kernels, and other grains that are badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat-damaged, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

Basis of Determination. Determine damaged kernels on a dockage-free and shrunken and broken-free portion of 15 grams.

In general, a kernel of triticale and/or kernels of other grains are considered damaged for inspection and grading purposes only when the damage is distinctly apparent and of such character as to be recognized as damaged for commercial purposes.

TYPES OF TRITICALE DAMAGE.

Germ-Damaged Kernels (Mold). Kernels and pieces of kernels of triticale which have mold in the germ. The bran coat covering the germ should be removed carefully; scraping the bran coat too deep could remove the mold. (Reference: Visual Reference Image No. [W-4.1](#))

Green Damage (Immature). Kernels and pieces of kernels of triticale which are intense green (immature) and without any yellow appearance. (Reference: Visual Reference Image No. [W-5.0](#))

Germ-Damaged Kernels (Sick). Kernels and pieces of kernels of triticale damaged as a result of heat but which are not materially discolored. Sick kernels should be scraped very carefully to avoid the loss of discoloration or "popping" or removal of the germ. (Reference: Visual Reference Image No. [W-4.0](#))

Heat-Damaged Kernels. Kernels and pieces of kernels of triticale materially discolored and damaged by heat. It is necessary, in most cases, to cut the kernels and make a cross-section analysis to determine if the color is reddish-brown, mahogany, or creamy.

Other Damage. Kernels and pieces of kernels of triticale with cracks, breaks, or chews and which contain mold or fungus. (Reference: Visual Reference Image No. [W-7.0](#))

Mold-like Substances. Whole kernels of triticale which are 50 percent or more covered and pieces of kernels which are discolored and covered with a mold-like substance.

Sprout-Damaged Kernels. Kernels with the germ end broken open from germination and show sprout or from which the sprouts have been broken off. (Reference: Visual Reference Image Nos. [W-8.0](#) and [W-8.1](#))

Insect-Bored Kernels. Kernels and pieces of kernels of triticale that have been bored or tunneled by insects. (Reference: Visual Reference Image No. [W-9.0](#))

Certification. Record the percent of damaged kernels on the certificate to the nearest tenth percent.

12.23 HEAT-DAMAGED KERNELS

Kernels, pieces of triticale kernels, and other grains that are materially discolored and damaged by heat.

Basis of Determination. Determine heat-damaged kernels on a dockage-free and shrunken and broken-free portion of 30 grams. (Reference: Visual Reference Image No. [W-6.1](#))

Certification. Record the percent of heat-damaged kernels on the certificate to the nearest tenth percent.

12.24 DEFECTS

Damaged kernels, foreign material, and shrunken and broken kernels. The sum of these three factors may not exceed the limit for the factor "defects" for each numerical grade.

Basis of Determination. Determine defects on the sum of damaged kernels, foreign material, and shrunken and broken kernels.

A percentage of defects cannot be shown when only one or two of the factors defined as defects have been determined. However, when one or two factors are determined and their sum would change the numerical grade, or come close to changing the grade, determine the other factor and record the percentage of defects.

Certification. Record the percent of defects on the certificate to the nearest tenth percent.